

**INDIANA DEPARTMENT OF TRANSPORTATION  
OFFICE OF MATERIALS MANAGEMENT**

**RANDOM SAMPLING  
ITM No. 802-08P**

**1.0 SCOPE.**

- 1.1** This procedure is used to determine the random unit, random quantity, or random location for sampling of construction materials. Use of this method is intended to minimize any bias on the part of the person taking the sample.
- 1.2** The values stated in either acceptable English or SI metric units are to be regarded separately as standard, as appropriate for a specification with which this ITM is used. Within the text, SI metric units are shown in parenthesis. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way.
- 1.3** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and to determining the applicability of regulatory limitations prior to use.

**2.0 TERMINOLOGY.** Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101 and ASTM D 16.

**3.0 SIGNIFICANCE AND USE.** This ITM is used to determine the unit, quantity, or location of the material to be sampled for acceptance in accordance with the Standard Specifications.

**4.0 RANDOM NUMBERS.**

- 4.1** The Random Number Tables consist of a list of numbers in blocks which are to be used in the random selection process. Only the Tables listed in the Appendix may be used.
- 4.2** To use a Random Number Table select without looking one block in the table.
- 4.3** After selecting the block, the top left number in the block is the first random number used. If a pair of random numbers is needed, the adjacent number within the block is used.
- 4.4** Proceed down the vertical column for additional numbers and proceed to the top of the adjacent column to the right, if available, when the bottom of the column is

reached. When the bottom of the last column on the right is reached, proceed to the top of the column of the first column on the left in the table.

If a pair of numbers is needed, proceed down the vertical column by pairs for additional numbers, and proceed to the adjacent top block to the right, if available. When the bottom pair of numbers on the right is reached, proceed to the top block on the left in the table.

- 4.5** If each number or pair of numbers in the table is used for the random selection process, select a new starting block in accordance with 3.3 and repeat the procedure.
- 4.6** If the random location results in a location that a sample is not allowed, then the random number shall be discarded and the next random number in sequence will be used, unless otherwise indicated.

## **5.0 PROCEDURE.**

### **5.1 Random Unit.**

- 5.1.1** Identify the number of units from which a random unit is required and label these units numerically beginning with 1 and increasing until all the units have a different number.
- 5.1.2** Select a random number in accordance with 3.0.
- 5.1.3** Multiply the number of units by the random number.
- 5.1.4** Round up the resulting number to the next whole number to determine the random unit.

Example:

Number of Samples = 4  
Random Number = 0.698  
Random Sample =  $4 \times 0.698 = 2.792$  (Round up to 3)

### **5.2 Random Quantity.**

- 5.2.1** Identify the quantity from which a random quantity is required.
- 5.2.2** Select a random number in accordance with 3.0.
- 5.2.3** Multiply the quantity by the random number.
- 5.2.4** The resulting number is the random quantity to be sampled.

### 5.2.5 The sample is obtained from the truck containing the random quantity.

Example:

English

Deleted: ¶

Sublot Size = 380 t of HMA

Random Number = 0.871

Random Quantity =  $380 \times 0.871 = 331$  t

Sample HMA from the truck containing ton number 331

S.I. Metric

Sublot Size = 380 Mg of HMA

Random Number = 0.871

Random Quantity =  $380 \times 0.871 = 331$  Mg

Sample HMA from the truck containing Mg number 331

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## 5.3 Random Location per Length.

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5.3.1 Identify the length from which a random location is required.

5.3.2 Select a random number in accordance with 3.0

5.3.3 Multiply the length by the random number.

5.3.4 The resulting number is the random distance.

5.3.5 Add the random distance to the beginning of the length to determine the random location.

## 5.4 Random Location per Area.

5.4.1 Identify the area from which a random location is required.

5.4.2 Select a pair of random numbers in accordance with 3.0. Use the first number for the longitudinal location and the second number for the transverse location.

5.4.3 Determine the longitudinal length in accordance with 4.3

5.4.4 Multiply the transverse width by the random number.

5.4.5 The resulting numbers represent the random location.

**HMA -- Plate Samples.**

The random location of a plate sample is determined from a random quantity, random longitudinal distance, and transverse distance as follows:

1. A random quantity is determined in accordance with 4.2.
2. The random longitudinal distance is determined from the length the mixture is placed by the truck containing the random quantity. The starting station for the longitudinal distance is the location of the paver where the truck begins to unload the mixture into the paver or material transfer device. Computations are made to the nearest 1 ft (1 m).
3. The random transverse distance is determined using the width of the course being placed. Computations are made to the nearest 1 ft (0.1 m). The distance is measured from the right edge of the course determined by looking in the direction of increasing station numbers. If the width of the course is 4 ft (4 m) or less, the sample plate will be placed in the center of the course.

Plate samples will not be taken at the following locations:

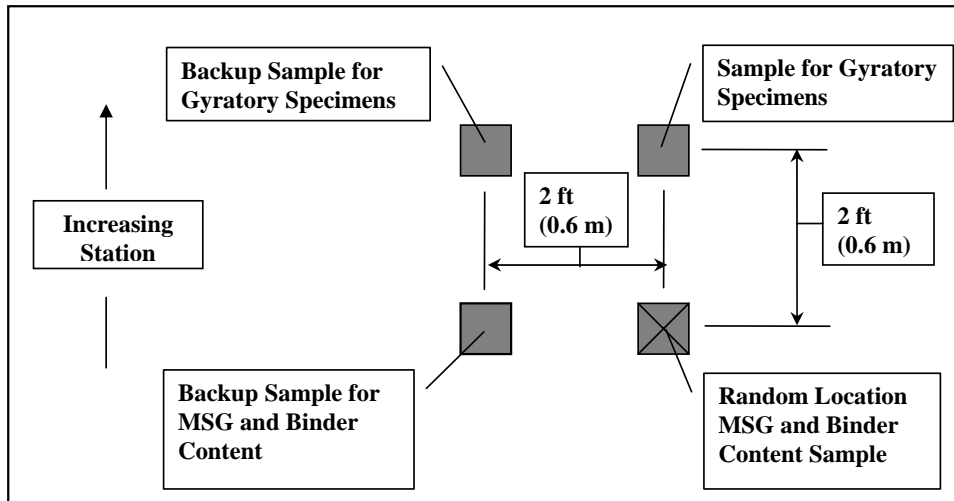
1. Less than 1 ft (0.3 m) from the edge of the course; or
2. A course thickness less than 2.0 times the maximum particle size.

When additional plate samples are required for gyratory specimens and backup samples, the following procedure is used:

1. The first plate location is determined using the procedure for HMA plate samples. This sample is used for the MSG and binder content determination.
2. The second plate is placed longitudinally 2 ft (0.6 m) ahead station from the first plate at the same transverse offset. This sample is used for the gyratory specimens.
3. The backup sample plate for the MSG and binder content is placed transversely 2 ft (0.6 m) from the first plate towards the center of the mat. If the width of the course is 4 ft (4 m) or less, the sample plate will be placed 2 ft (0.6m) back station from the first plate in the center of the course.

4. The backup sample plate for the gyratory specimens is placed transversely 2 ft (0.6 m) from the second plate toward the center of the mat. If the width of the course is 4 ft (4 m) or less, the sample plate will be placed 2 ft (0.6m) ahead station from the second plate in the center of the course.

The following diagram shows an example of the arrangement of the plate samples when additional samples are required and backup samples are taken transversely from the first and second sample locations:



Example No. 1:

English

A 25.0 mm base mixture is being placed at 250 lb/yd<sup>2</sup> for a width of 12 ft. The truck contains 20 t of mixture. The station of the paver when the truck begins unloading is 105+00.

Sublot Size = 1000 t  
 Random Number = 0.613  
 Random Quantity = 1000 x 0.613 = 613

$$\text{Length of Load} = \frac{\text{Load Weight, t}}{\text{Avg. Planned Quantity, lb/yd}^2 \times \text{Width, ft}} \times 18000$$

$$= \frac{20}{25 \times 12} \times 18000 = 120 \text{ ft}$$

Random Numbers = 0.428, 0.417  
 Longitudinal Distance =  $120 \times 0.428 = 51$  ft  
 Random Location =  $105+00 + 51 = 105+51$   
 Transverse Distance =  $12 \times 0.417 = 5$  ft

If additional samples are required, the following locations are determined:

Gyratory Specimen Sample:

Random Location =  $105+51 + 02 = 105+53$   
 Transverse Distance = 5 ft

Backup Sample for MSG and Binder Content:

Random Location =  $105+51$   
 Transverse Distance =  $5 + 2 = 7$  ft

Backup Sample for Gyratory Specimen:

Random Location =  $105+51 + 02 = 105+53$   
 Transverse Distance =  $5 + 2 = 7$  ft

SI Metric

A 25.0 mm base mixture is being placed at  $180 \text{ kg/m}^2$  for a width of 3.6 m. The truck contains 18 Mg of mixture. The station of the pavers when the truck begins unloading is 10+500.

Sublot Size = 1000 Mg  
 Random Number = 0.613  
 Random Quantity =  $1000 \times 0.613 = 613$

$$\begin{aligned}
 \text{Length of Load} &= \frac{\text{Load Mass, Mg}}{\text{Avg. Planned Quantity, kg/m}^2 \times \text{Width, m}} \times 100 \\
 &= \frac{18}{180 \times 3.6} \times 100 = 28
 \end{aligned}$$

Random Numbers = 0.428, 0.417  
 Longitudinal Distance =  $28 \times 0.428 = 12$  m  
 Random Location =  $10+500 + 12 = 10+512$   
 Transverse Distance =  $3.6 \times 0.417 = 1.5$  m

The additional sample locations are determined as follows:

Gyratory Specimen Samples:

Random Location =  $10+512 + 0.6 = 10+513$  (nearest meter)  
 Transverse Distance = 1.5 m

Backup Sample for MSG and Binder Content:

Random Location = 10+512

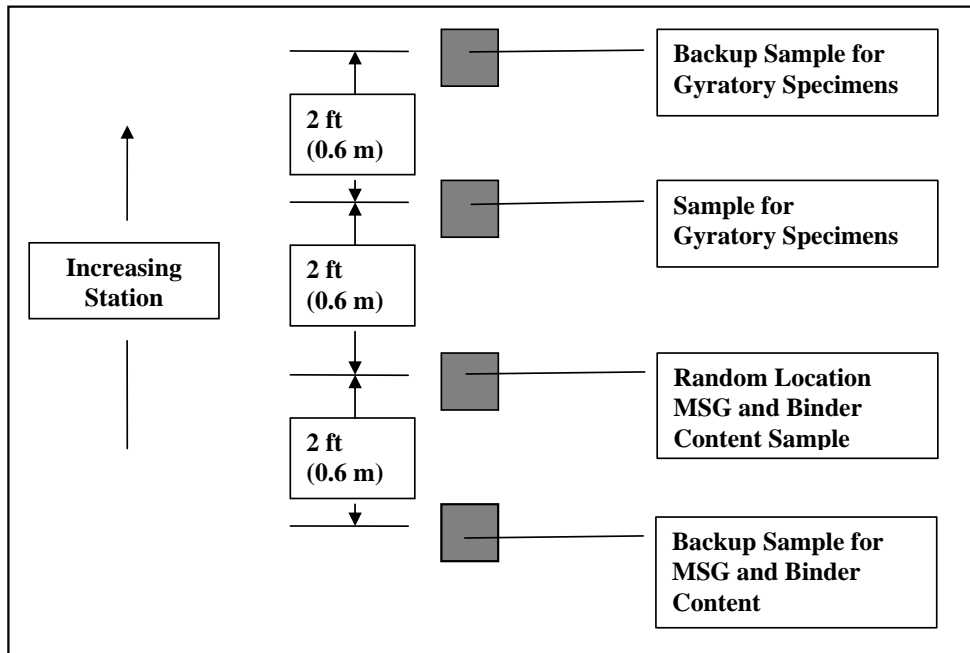
Transverse Distance =  $1.5 + 0.6 = 2.1$  m

Backup Sample for Gyratory Specimen:

Random Location =  $10+512 + 0.6 = 10+513$  (nearest meter)

Transverse Distance =  $1.5 + 0.6 = 2.1$  m

The following diagram shows an example of the arrangement of the plate samples when additional samples are required and backup samples are taken longitudinally from the first and second plate sample locations:



Example No. 2:

English

A 25.0 mm base mixture is being placed at 250 lb/yd<sup>2</sup> for a width of 4 ft. The truck contains 20 t of mixture. The station of the paver when the truck begins unloading is 105+00.

Sublot Size = 1000 t

Random Number = 0.613

Random Quantity =  $1000 \times 0.613 = 613$

$$\text{Length of Load} = \frac{\text{Load Weight, t}}{\text{Avg. Planned Quantity, lb/yd}^2 \times \text{Width, ft}} \times 18000$$

$$= \frac{20}{25 \times 12} \times 18000 = 120 \text{ ft}$$

Random Number = 0.428  
 Longitudinal Distance =  $120 \times 0.428 = 51 \text{ ft}$   
 Random Location =  $105+00 + 51 = 105+51$   
 Transverse Distance = 2 ft (1/2 of width placed)

The additional sample locations are determined as follows:

Gyratory Specimen Sample:

Random Location =  $105+51 + 02 = 105+53$   
 Transverse Distance = 2 ft

Backup Sample for MSG and Binder Content:

Random Location =  $105+51 - 02 = 105+ 49$   
 Transverse Distance = 2 ft

Backup Sample for Gyratory Specimen:

Random Location =  $105+53 + 02 = 105+55$   
 Transverse Distance = 2 ft

SI Metric

A 25.0 mm base mixture is being placed at  $180 \text{ kg/m}^2$  for a width of 1.2 m. The truck contains 18 Mg of mixture. The station of the pavers when the truck begins unloading is 10+500.

Sublot Size = 1000 Mg  
 Random Number = 0.613  
 Random Quantity =  $1000 \times 0.613 = 613$

$$\text{Length of Load} = \frac{\text{Load Mass, Mg}}{\text{Avg. Planned Quantity, kg/m}^2 \times \text{Width, m}} \times 100$$

$$= \frac{18}{180 \times 3.6} \times 100 = 28$$



Random Numbers = 0.428  
 Longitudinal Distance =  $28 \times 0.428 = 12 \text{ m}$   
 Random Location =  $10+500 + 12 = 10+512$   
 Transverse Distance = 0.6 m

The additional sample locations are determined as follows:

Gyratory Specimen Samples:

Random Location =  $10+512 + 0.6 = 10+513$  (nearest meter)  
 Transverse Distance = 0.6 m

Backup Sample for MSG and Binder Content:

Random Location =  $10+512 - 0.6\text{m} = 10+511$  (nearest meter)  
 Transverse Distance = 0.6 m

Backup Sample for Gyratory Specimen:

Random Location =  $10+513 + 0.6 = 10+514$  (nearest meter)  
 Transverse Distance = 0.6 m

### **HMA -- Density Using Cores.**

The station at which a core is taken is determined using the length of pavement needed for a subplot of HMA. The transverse distance is determined using the width of the course being placed and is measured from the right edge of the course determined by looking in the direction of increasing station numbers. Computations for the longitudinal distance are made to the nearest 1 ft (1 m) and computations for the transverse distance are made to the nearest 0.1 ft (0.1 m). Cores will not be taken at the following locations:

1. Less than 3 in. (75 mm) from a confined edge of the course being placed;
2. Less than 6 in. (150 mm) from a non-confined edge of the course being placed; or
3. A course thickness less than 2.0 times the maximum particle size.

English

A 19.0 mm intermediate mixture is being placed at 165 lb/yd<sup>2</sup> for a width of 12 ft. The starting station of the subplot is 158+00. The subplot size is 1000 t.

$$\begin{aligned}\text{Length of Load} &= \frac{\text{Sublot Size, t}}{\text{Avg. Planned Quantity, lb/yd}^2 \times \text{Width, ft}} \times 18000 \\ &= \frac{1000}{165 \times 12} \times 18000 = 9090 \text{ ft}\end{aligned}$$

Random Numbers = 0.256, 0.561  
 Longitudinal Distance =  $9090 \times 0.256 = 2327 \text{ ft}$   
 Random Station =  $(158+00) + (23+27) = 181+27$   
 Transverse Distance =  $12 \times 0.561 = 6.7 \text{ ft}$  (Say 7 ft)

#### SI Metric

A 19.0 mm intermediate mixture is being placed at  $120 \text{ kg/m}^2$  for a width of 3.6 m. The starting station of the sublot is 15+800. The sublot size is 1000 Mg.

$$\begin{aligned}\text{Length of Load} &= \frac{\text{Sublot Size, Mg}}{\text{Avg. Planned Quantity, kg/m}^2 \times \text{Width, m}} \times 100 \\ &= \frac{1000}{120 \times 3.6} \times 1000 = 2315 \text{ m}\end{aligned}$$

Random Numbers = 0.256, 0.561  
 Longitudinal Distance =  $2315 \times 0.256 = 77 \text{ m}$   
 Random Station =  $15+800 + 77 = 15+877$   
 Transverse Distance =  $3.6 \times 0.561 = 2.0 \text{ m}$

#### PCCP -- Core Thickness.

The station at which a core is taken is determined using the length of pavement needed for the sublot of PCCP. The transverse distance is determined using the width of pavement being placed, and is measured from the right edge of the lane determined by looking in the direction of increasing station numbers. Computations for the longitudinal distance are made to the nearest 1 ft (1 m) and computations for the transverse distance are made to the nearest 1 ft (0.1 m). Cores will not be taken at the following locations:

1. Less than 2 ft (0.6 m) from a D-1 contraction joint;
2. Less than 3 in. (75 mm) from the longitudinal joint; or
3. Less than 5 ft (1.5 m) from a transverse construction joint.

If a core location is less than 2 ft (0.6 m) from the edge of pavement, a new location will be determined by subtracting or adding 2 ft (0.6 m) from the random transverse distance. If a core location is over a dowel bar, a new location will be determined by subtracting or adding 3 ft (1 m) from the random station. If a core location is less than 5 ft (1.5 m) from a transverse construction joint, a new location will be determined by subtracting or adding 5 ft (1.5 m) from the random station.

#### English

A PCCP is being placed at a width of 12 ft and the starting station of the subplot is 75+00. The subplot size is 2400 yd<sup>2</sup>.

$$\begin{aligned}\text{Length of Sublot} &= \frac{\text{Sublot Size, yd}^2}{\text{Width, nearest ft}} \times \frac{9 \text{ ft}^2}{1 \text{ yd}^2} \\ &= \frac{2400}{12} \times 9 = 1800 \text{ ft}\end{aligned}$$

Random Numbers = 0.935, 0.114  
 Longitudinal Distance = 1800 x 0.935 = 1683 ft  
 Random Station = (75+00) + (16+83) = 91+83  
 Transverse Distance = 12 x 0.114 = 1.4 ft (Say 1 ft)  
 (Too close to edge of pavement)  
 = 1 + 2 = 3 ft

#### S.I. Metric

A PCCP is being placed at a width of 3.6 m and the starting station of the subplot is 7+500. The subplot size is 2000 m<sup>2</sup>.

$$\begin{aligned}\text{Length of Sublot} &= \frac{\text{Sublot Size, m}^2}{\text{Width, nearest 0.1 m}} \\ &= \frac{2000}{3.6} = 556 \text{ m}\end{aligned}$$

Random Numbers = 0.935, 0.114  
 Longitudinal Distance = 556 x 0.935 = 520 m  
 Random Station = 7+500 + 520 = 8+020  
 Transverse Distance = 3.6 x 0.114 = 0.4 m  
 (Too close to edge of pavement)  
 = 0.4 + 0.6 = 1.0 m

## 5.5 Random Target Area.

- 5.5.1 Determine the area from which a random location is required to the nearest 1 yd<sup>2</sup> (1 m<sup>2</sup>)
- 5.5.2 Divide the area by 100 and round down to the nearest whole number. The resulting number will be the number of segments within the area that are available for sampling.
- 5.5.3 Divide the area by the number of sample segments to determine the sample segment size to the nearest 1 yd<sup>2</sup> (1 m<sup>2</sup>)
- 5.5.4 Select a random number in accordance with 3.0
- 5.5.5 Multiply the number of sample segments by the random number and round down to the nearest whole number. The resulting number represents the random target area. The sample will be taken from material placed within the random target area.
- 5.5.6 Divide the sample segment size by the width of the area and round to the nearest 0.1 ft (0.1 m) length. The resulting number is the length of the random target area.
- 5.5.7 Multiply the random target area by the length of the random target area and round to the nearest whole foot (meter). The resulting number will be the distance to the beginning of the random target area as measured from the start of the area to be sampled.

### Portland Cement Concrete Pavement (PCCP) -- Plastic Concrete Samples.

The location of the random target area is determined for each subplot. The PCCP sample is taken from material placed within the random target area.

Example No. 1:

English

A PCCP is being placed at a width of 12 ft and the starting station of the subplot is 102+50.

The subplot size is 2400 yd<sup>2</sup>.

$$\text{Number of Sample Segments} = \frac{2400}{100} = 24$$

$$\text{Sample Segment Size} = \frac{2400}{24} = 100 \text{ yd}^2$$

$$\text{Random Number} = 0.830$$

$$\text{Random Target Area} = 24 \times 0.830 = 19.9 \quad (\text{round down to } 19)$$

$$\begin{aligned} \text{Length of Random Target Area} &= \frac{\text{Sample Segment Size, yd}^2}{\text{Width, nearest 0.1 ft}} \times \frac{9 \text{ ft}^2}{1 \text{ yd}^2} \\ &= \frac{100}{12} \times 9 = 75 \text{ ft} \end{aligned}$$

$$\text{Distance to the beginning of the Random Target Area} = 19 \times 75 = 1425 \text{ ft}$$

S.I. Metric

A PCCP is being placed at a width of 3.6 m and the starting station of the subplot is 10+250. The subplot size is 2000 m<sup>2</sup>.

$$\text{Number of Sample Segments} = \frac{2000}{100} = 20$$

$$\text{Sample Segment Size} = \frac{2000}{20} = 100 \text{ m}^2$$

$$\text{Random Number} = 0.830$$

$$\text{Random Target Area} = 20 \times 0.830 = 16.6 \quad (\text{round down to } 16)$$

$$\begin{aligned} \text{Length of Random Target Area} &= \frac{\text{Sample Segment Size, m}^2}{\text{Width, nearest 0.1 m}} \\ &= \frac{100}{3.6} \times 27.78 \text{ m (round to } 27.8 \text{ m)} \end{aligned}$$

$$\begin{aligned} \text{Distance to the beginning of the Random Target Area} &= 16 \times 27.8 = 444.8 \text{ m} \\ &\quad (\text{round to } 445 \text{ m}) \end{aligned}$$

## Example No. 2:

English

A PCCP is being placed at a width of 24 ft and the starting station of the subplot is 165+00. The subplot size is 550 yd<sup>2</sup>.

$$\text{Number of Sample Segments} = \frac{550}{100} = 5.5 \text{ (round down to 5)}$$

$$\text{Sample Segment Size} = \frac{550}{5} = 110 \text{ yd}^2$$

$$\text{Random Number} = 0.361$$

$$\text{Random Target Area} = 5 \times 0.361 = 1.8 \text{ (round down to 1)}$$

$$\begin{aligned} \text{Length of Random Target Area} &= \frac{\text{Sample Segment Size, yd}^2}{\text{Width, nearest 0.1 ft}} \times \frac{9 \text{ ft}^2}{1 \text{ yd}^2} \\ &= \frac{110}{24} \times 9 = 41.2 \text{ ft} \end{aligned}$$

$$\text{Station of Random Target Area} = 165+00 \text{ to } (165+00 + 41) = 165+00 \text{ to } 165+41$$

S.I. Metric

A PCCP is being placed at a width of 7.2 m and the starting station of the subplot is 16+500. The subplot size is 450 m<sup>2</sup>.

$$\text{Number of Sample Segments} = \frac{450}{100} = 4.5 \text{ (round down to 4)}$$

$$\text{Sample Segment Size} = \frac{450}{4} = 112 \text{ m}^2$$

$$\text{Random Number} = 0.361$$

$$\text{Random Target Area} = 4 \times 0.361 = 1.4 \text{ (round down to 1)}$$

$$\begin{aligned} \text{Length of Random Target Area} &= \frac{\text{Sample Segment Size, m}^2}{\text{Width, nearest 0.1 m}} \\ &= \frac{112}{7.2} \times 15.56 \text{ m (round to 15.6 m)} \end{aligned}$$

$$\text{Distance to the beginning of the Random Target Area} = 1 \times 15.6 \text{ m} = 15.6 \text{ m} \\ \text{(round to 16 m)}$$

RANDOM NUMBER TABLE

0.576	0.730	0.430	0.754	0.271	0.870	0.732	0.721	0.998	0.239
0.892	0.948	0.858	0.025	0.935	0.114	0.153	0.508	0.749	0.291
0.669	0.726	0.501	0.402	0.231	0.505	0.009	0.420	0.517	0.858
0.609	0.482	0.809	0.140	0.396	0.025	0.937	0.310	0.253	0.761
0.971	0.824	0.902	0.470	0.997	0.392	0.892	0.957	0.040	0.463
0.053	0.899	0.554	0.627	0.427	0.760	0.470	0.040	0.904	0.993
0.810	0.159	0.225	0.163	0.549	0.405	0.285	0.542	0.231	0.919
0.081	0.277	0.035	0.039	0.860	0.507	0.081	0.538	0.986	0.501
0.982	0.468	0.334	0.921	0.690	0.806	0.879	0.414	0.106	0.031
0.095	0.801	0.576	0.417	0.251	0.884	0.522	0.235	0.389	0.222
0.509	0.025	0.794	0.850	0.917	0.887	0.751	0.608	0.698	0.683
0.371	0.059	0.164	0.838	0.289	0.169	0.569	0.977	0.796	0.996
0.165	0.996	0.356	0.375	0.654	0.979	0.815	0.592	0.348	0.743
0.477	0.535	0.137	0.155	0.767	0.187	0.579	0.787	0.358	0.595
0.788	0.101	0.434	0.638	0.021	0.894	0.324	0.871	0.698	0.539
0.566	0.815	0.622	0.548	0.947	0.169	0.817	0.472	0.864	0.466
0.901	0.342	0.873	0.964	0.942	0.985	0.123	0.086	0.335	0.212
0.470	0.682	0.412	0.064	0.150	0.962	0.925	0.355	0.909	0.019
0.068	0.242	0.777	0.356	0.195	0.313	0.396	0.460	0.740	0.247
0.874	0.420	0.127	0.284	0.448	0.215	0.833	0.652	0.701	0.326
0.897	0.877	0.209	0.862	0.428	0.117	0.100	0.259	0.425	0.284
0.876	0.969	0.109	0.843	0.759	0.239	0.890	0.317	0.428	0.802
0.190	0.696	0.757	0.283	0.777	0.491	0.523	0.665	0.919	0.246
0.341	0.688	0.587	0.908	0.865	0.333	0.928	0.404	0.892	0.696
0.846	0.355	0.831	0.218	0.945	0.364	0.673	0.305	0.195	0.887
0.882	0.227	0.552	0.077	0.454	0.731	0.716	0.265	0.058	0.075
0.464	0.658	0.629	0.269	0.069	0.998	0.917	0.217	0.220	0.659
0.123	0.791	0.503	0.447	0.659	0.463	0.994	0.307	0.631	0.422
0.116	0.120	0.721	0.137	0.263	0.176	0.798	0.879	0.432	0.391
0.836	0.206	0.914	0.574	0.870	0.390	0.104	0.755	0.082	0.939
0.636	0.195	0.614	0.486	0.629	0.663	0.619	0.007	0.296	0.456
0.630	0.673	0.665	0.666	0.399	0.592	0.441	0.649	0.270	0.612
0.804	0.112	0.331	0.606	0.551	0.928	0.830	0.841	0.702	0.183
0.360	0.193	0.181	0.399	0.564	0.772	0.890	0.062	0.919	0.875
0.183	0.651	0.157	0.150	0.800	0.875	0.205	0.446	0.648	0.685

RANDOM NUMBER TABLE

0.206	0.455	0.609	0.131	0.382	0.576	0.589	0.985	0.587	0.410
0.352	0.463	0.735	0.539	0.683	0.419	0.464	0.190	0.014	0.197
0.807	0.721	0.889	0.228	0.889	0.553	0.475	0.104	0.308	0.814
0.992	0.265	0.134	0.914	0.978	0.144	0.330	0.818	0.538	0.519
0.615	0.852	0.291	0.196	0.478	0.271	0.567	0.091	0.052	0.533
0.691	0.944	0.451	0.873	0.945	0.843	0.901	0.743	0.193	0.563
0.456	0.796	0.900	0.222	0.706	0.350	0.466	0.903	0.007	0.409
0.342	0.380	0.314	0.455	0.403	0.818	0.916	0.803	0.370	0.153
0.305	0.745	0.720	0.213	0.804	0.362	0.793	0.685	0.443	0.003
0.125	0.399	0.675	0.403	0.269	0.942	0.800	0.565	0.210	0.095
0.750	0.644	0.178	0.912	0.102	0.378	0.715	0.707	0.060	0.811
0.495	0.674	0.223	0.372	0.790	0.496	0.934	0.762	0.941	0.553
0.749	0.925	0.008	0.386	0.170	0.266	0.869	0.463	0.308	0.044
0.557	0.768	0.417	0.902	0.230	0.775	0.556	0.129	0.602	0.023
0.265	0.158	0.168	0.200	0.650	0.302	0.460	0.811	0.449	0.783
0.461	0.833	0.513	0.754	0.450	0.553	0.154	0.741	0.111	0.693
0.092	0.901	0.948	0.296	0.937	0.401	0.637	0.356	0.108	0.993
0.233	0.487	0.084	0.363	0.719	0.451	0.299	0.063	0.971	0.779
0.178	0.680	0.528	0.814	0.437	0.484	0.265	0.107	0.754	0.234
0.642	0.302	0.860	0.126	0.350	0.477	0.018	0.083	0.648	0.737
0.936	0.847	0.548	0.735	0.843	0.653	0.507	0.678	0.201	0.722
0.886	0.138	0.957	0.002	0.709	0.746	0.112	0.723	0.639	0.381
0.823	0.960	0.512	0.860	0.380	0.903	0.334	0.709	0.734	0.241
0.496	0.030	0.730	0.645	0.605	0.585	0.459	0.856	0.506	0.388
0.624	0.021	0.751	0.172	0.520	0.123	0.616	0.943	0.757	0.946
0.625	0.408	0.690	0.402	0.039	0.189	0.675	0.564	0.244	0.777
0.283	0.915	0.720	0.007	0.406	0.356	0.771	0.975	0.576	0.760
0.296	0.996	0.678	0.920	0.872	0.720	0.426	0.388	0.682	0.142
0.735	0.002	0.388	0.170	0.238	0.711	0.880	0.716	0.728	0.961
0.222	0.103	0.616	0.330	0.512	0.018	0.108	0.558	0.996	0.969
0.632	0.796	0.235	0.924	0.340	0.330	0.644	0.646	0.637	0.825
0.551	0.679	0.022	0.454	0.455	0.858	0.324	0.176	0.965	0.477
0.161	0.282	0.057	0.409	0.417	0.157	0.703	0.636	0.579	0.819
0.600	0.985	0.309	0.414	0.116	0.426	0.577	0.072	0.784	0.143
0.248	0.654	0.277	0.986	0.395	0.607	0.886	0.042	0.577	0.173



RANDOM NUMBER TABLE

0.779	0.284	0.210	0.877	0.351	0.611	0.544	0.091	0.483	0.778
0.438	0.495	0.264	0.694	0.005	0.970	0.594	0.757	0.710	0.912
0.071	0.491	0.689	0.601	0.408	0.360	0.483	0.766	0.541	0.674
0.691	0.646	0.759	0.965	0.337	0.494	0.054	0.846	0.485	0.772
0.075	0.270	0.325	0.371	0.381	0.590	0.868	0.643	0.597	0.233
0.888	0.375	0.489	0.450	0.263	0.842	0.586	0.862	0.153	0.228
0.613	0.838	0.358	0.725	0.958	0.146	0.424	0.601	0.363	0.895
0.639	0.967	0.636	0.724	0.495	0.357	0.132	0.797	0.098	0.665
0.272	0.257	0.765	0.217	0.339	0.928	0.241	0.464	0.608	0.348
0.041	0.365	0.358	0.628	0.208	0.297	0.028	0.062	0.326	0.765
0.795	0.849	0.984	0.550	0.453	0.592	0.216	0.100	0.179	0.257
0.961	0.325	0.114	0.732	0.829	0.637	0.706	0.950	0.977	0.265
0.840	0.934	0.012	0.949	0.269	0.581	0.872	0.310	0.763	0.893
0.738	0.848	0.613	0.699	0.129	0.781	0.263	0.397	0.688	0.198
0.594	0.960	0.898	0.519	0.034	0.853	0.070	0.136	0.151	0.829
0.569	0.905	0.347	0.957	0.034	0.302	0.594	0.708	0.529	0.219
0.358	0.828	0.920	0.887	0.349	0.491	0.616	0.785	0.460	0.572
0.458	0.763	0.207	0.483	0.203	0.996	0.186	0.076	0.647	0.883
0.060	0.145	0.114	0.934	0.733	0.786	0.961	0.241	0.172	0.995
0.401	0.248	0.516	0.911	0.669	0.991	0.999	0.617	0.547	0.969
0.964	0.458	0.356	0.414	0.953	0.176	0.987	0.381	0.256	0.309
0.118	0.918	0.142	0.540	0.448	0.889	0.555	0.205	0.879	0.362
0.254	0.600	0.806	0.126	0.299	0.754	0.373	0.779	0.594	0.301
0.254	0.838	0.398	0.389	0.970	0.018	0.132	0.512	0.569	0.608
0.427	0.410	0.434	0.847	0.787	0.001	0.524	0.828	0.448	0.087
0.342	0.746	0.382	0.662	0.670	0.065	0.133	0.067	0.958	0.630
0.112	0.129	0.663	0.666	0.018	0.522	0.454	0.813	0.405	0.698
0.767	0.879	0.390	0.279	0.994	0.474	0.004	0.831	0.323	0.414
0.940	0.989	0.854	0.835	0.957	0.154	0.493	0.642	0.637	0.578
0.271	0.337	0.728	0.173	0.840	0.814	0.777	0.877	0.028	0.794
0.078	0.590	0.712	0.705	0.336	0.603	0.992	0.214	0.934	0.800
0.799	0.519	0.235	0.113	0.936	0.059	0.793	0.504	0.065	0.526
0.033	0.873	0.130	0.921	0.485	0.146	0.330	0.633	0.835	0.172
0.423	0.958	0.967	0.605	0.632	0.710	0.217	0.613	0.259	0.699
0.273	0.945	0.329	0.895	0.813	0.154	0.149	0.425	0.881	0.029

RANDOM NUMBER TABLE

0.731	0.731	0.423	0.958	0.950	0.212	0.700	0.267	0.448	0.975
0.799	0.629	0.160	0.292	0.932	0.083	0.068	0.763	0.794	0.785
0.061	0.225	0.782	0.150	0.006	0.645	0.422	0.666	0.818	0.182
0.272	0.685	0.643	0.687	0.945	0.205	0.461	0.399	0.588	0.677
0.941	0.170	0.982	0.792	0.435	0.142	0.244	0.140	0.395	0.295
0.428	0.330	0.534	0.376	0.903	0.036	0.165	0.725	0.200	0.736
0.618	0.542	0.219	0.787	0.114	0.594	0.833	0.070	0.114	0.450
0.080	0.806	0.777	0.185	0.473	0.341	0.810	0.462	0.811	0.736
0.190	0.444	0.671	0.642	0.726	0.451	0.955	0.952	0.859	0.929
0.343	0.766	0.809	0.365	0.646	0.768	0.717	0.848	0.053	0.545
0.281	0.633	0.189	0.261	0.950	0.549	0.906	0.164	0.921	.791
0.974	0.666	0.600	0.834	0.832	0.205	0.163	0.668	0.096	0.350
0.819	0.495	0.392	0.968	0.755	0.917	0.266	0.452	0.341	0.095
0.131	0.253	0.777	0.120	0.753	0.008	0.205	0.626	0.826	0.778
0.522	0.878	0.990	0.159	0.278	0.643	0.024	0.287	0.707	0.373
0.510	0.132	0.722	0.906	0.800	0.932	0.009	0.383	0.677	0.289
0.094	0.058	0.483	0.285	0.264	0.546	0.047	0.761	0.085	0.786
0.186	0.546	0.975	0.715	0.628	0.525	0.231	0.444	0.077	0.066
0.797	0.784	0.884	0.604	0.954	0.992	0.175	0.129	0.224	0.984
0.485	0.263	0.597	0.268	0.498	0.722	0.184	0.686	0.536	0.089
0.573	0.755	0.217	0.463	0.776	0.492	0.420	0.107	0.164	0.940
0.266	0.433	0.175	0.403	0.519	0.730	0.091	0.385	0.984	0.578
0.880	0.037	0.157	0.535	0.466	0.215	0.818	0.636	0.215	0.276
0.396	0.158	0.227	0.636	0.823	0.238	0.172	0.522	0.805	0.109
0.436	0.091	0.271	0.032	0.644	0.475	0.372	0.399	0.481	0.605
0.850	0.863	0.748	0.453	0.925	0.418	0.018	0.570	0.834	0.079
0.839	0.866	0.943	0.093	0.493	0.530	0.995	0.282	0.544	0.532
0.103	0.528	0.632	0.643	0.780	0.752	0.974	0.850	0.997	0.303
0.218	0.786	0.065	0.149	0.903	0.049	0.223	0.487	0.242	0.559
0.693	0.355	0.412	0.535	0.878	0.121	0.031	0.919	0.710	0.069
0.339	0.521	0.001	0.297	0.190	0.802	0.682	0.836	0.694	0.242
0.515	0.885	0.494	0.739	0.373	0.058	0.026	0.386	0.658	0.455
0.076	0.471	0.334	0.422	0.136	0.871	0.818	0.790	0.365	0.276
0.367	0.901	0.023	0.530	0.992	0.758	0.821	0.399	0.926	0.974
0.795	0.218	0.884	0.070	0.291	0.436	0.905	0.271	0.181	0.881

RANDOM NUMBER TABLE

0.344	0.569	0.290	0.243	0.451	0.836	0.596	0.159	0.878	0.107
0.409	0.991	0.666	0.609	0.026	0.620	0.772	0.318	0.987	0.197
0.375	0.596	0.892	0.472	0.916	0.252	0.988	0.470	0.980	0.566
0.547	0.253	0.020	0.474	0.462	0.096	0.515	0.729	0.251	0.676
0.350	0.802	0.627	0.825	0.866	0.765	0.999	0.268	0.058	0.968
0.885	0.786	0.077	0.805	0.089	0.953	0.055	0.825	0.436	0.330
0.389	0.889	0.169	0.491	0.804	0.132	0.862	0.703	0.558	0.808
0.839	0.142	0.211	0.099	0.662	0.627	0.919	0.012	0.104	0.378
0.100	0.781	0.332	0.776	0.546	0.370	0.524	0.470	0.919	0.796
0.510	0.331	0.467	0.221	0.364	0.434	0.386	0.642	0.077	0.456
0.481	0.599	0.085	0.647	0.500	0.120	0.592	0.103	0.702	0.999
0.213	0.195	0.999	0.470	0.268	0.215	0.220	0.043	0.360	0.024
0.431	0.730	0.905	0.420	0.210	0.805	0.723	0.137	0.156	0.031
0.029	0.832	0.713	0.435	0.520	0.503	0.452	0.981	0.633	0.118
0.240	0.329	0.015	0.550	0.088	0.086	0.325	0.397	0.061	0.806
0.906	0.743	0.882	0.924	0.310	0.456	0.396	0.784	0.686	0.184
0.559	0.408	0.245	0.212	0.802	0.017	0.841	0.598	0.142	0.228
0.161	0.678	0.660	0.388	0.964	0.169	0.184	0.237	0.222	0.328
0.068	0.035	0.547	0.227	0.818	0.008	0.467	0.353	0.615	0.264
0.459	0.348	0.664	0.718	0.920	0.382	0.824	0.039	0.462	0.235
0.541	0.776	0.752	0.366	0.016	0.827	0.608	0.923	0.601	0.087
0.517	0.859	0.217	0.074	0.766	0.689	0.650	0.404	0.729	0.980
0.669	0.598	0.372	0.594	0.043	0.378	0.416	0.857	0.039	0.905
0.274	0.385	0.352	0.367	0.149	0.327	0.160	0.283	0.840	0.708
0.235	0.165	0.658	0.567	0.982	0.094	0.690	0.319	0.605	0.706
0.881	0.556	0.066	0.062	0.614	0.018	0.030	0.035	0.728	0.859
0.326	0.663	0.566	0.470	0.421	0.477	0.066	0.018	0.825	0.434
0.683	0.304	0.968	0.239	0.663	0.236	0.277	0.317	0.214	0.478
0.618	0.944	0.985	0.105	0.540	0.183	0.748	0.009	0.353	0.963
0.925	0.226	0.388	0.513	0.526	0.718	0.539	0.924	0.442	0.197
0.685	0.943	0.431	0.317	0.476	0.228	0.414	0.064	0.955	0.340
0.658	0.412	0.512	0.885	0.685	0.636	0.851	0.584	0.048	0.951
0.869	0.495	0.608	0.567	0.035	0.493	0.500	0.229	0.826	0.337
0.125	0.157	0.056	0.436	0.657	0.602	0.823	0.453	0.823	0.099
0.569	0.998	0.733	0.097	0.268	0.640	0.272	0.718	0.153	0.644